



## Modeling contaminant transport in limestone aquifers

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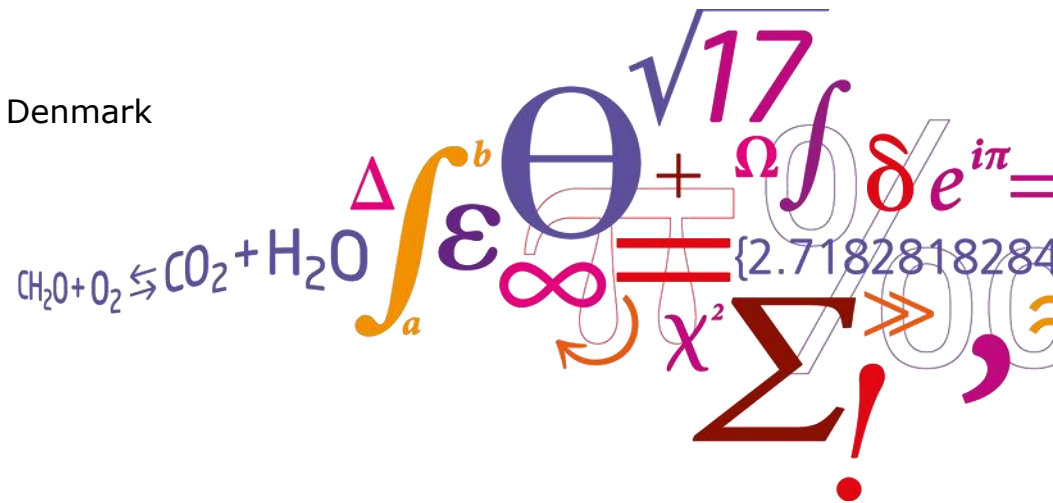
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# Modeling contaminant transport in limestone aquifers

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Magnus Rohde<sup>3</sup>, Mette M. Broholm<sup>1</sup>, Poul L. Bjerg<sup>1</sup>  
and **Philip J. Binning<sup>1</sup>***

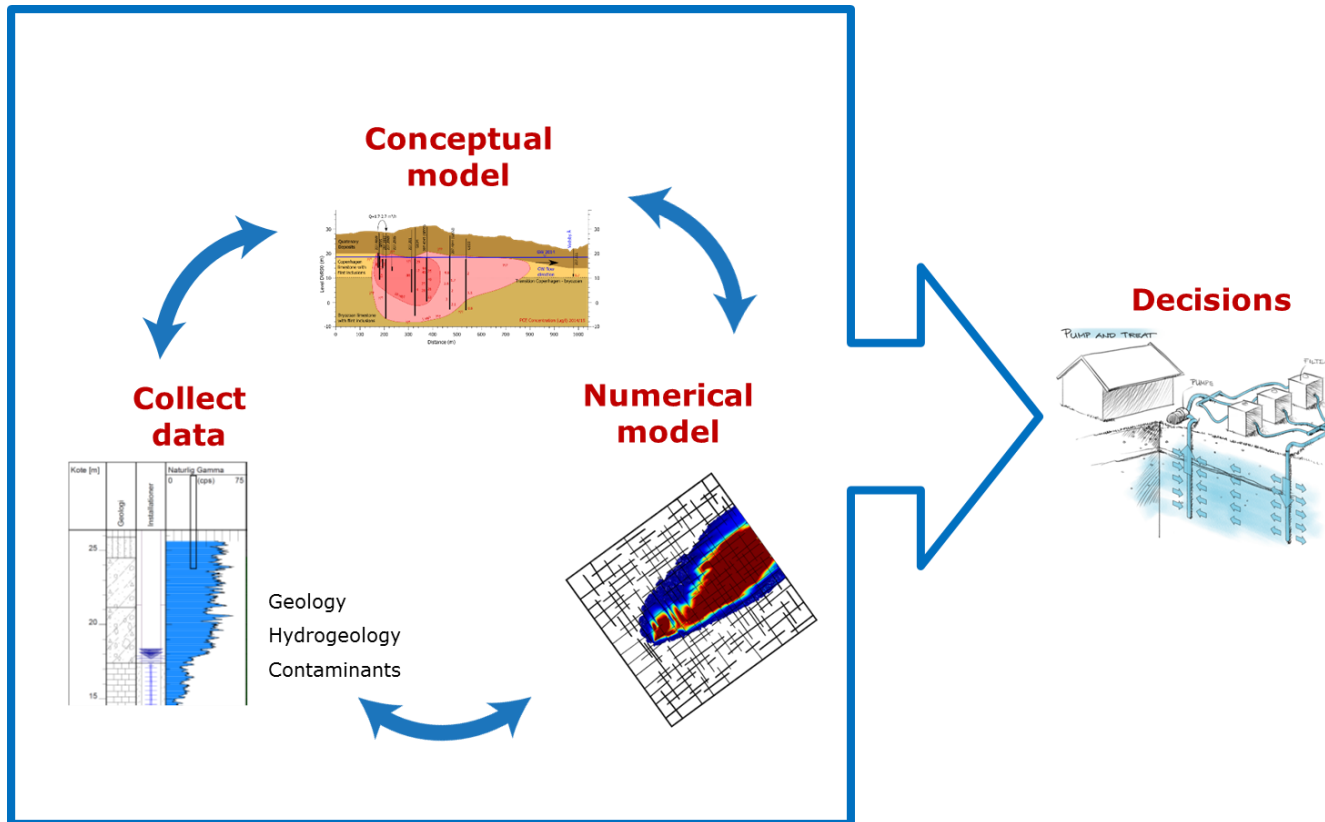
- 1 – DTU Environment, Technical University of Denmark
- 2 – The Capital Region of Denmark
- 3 – GEO



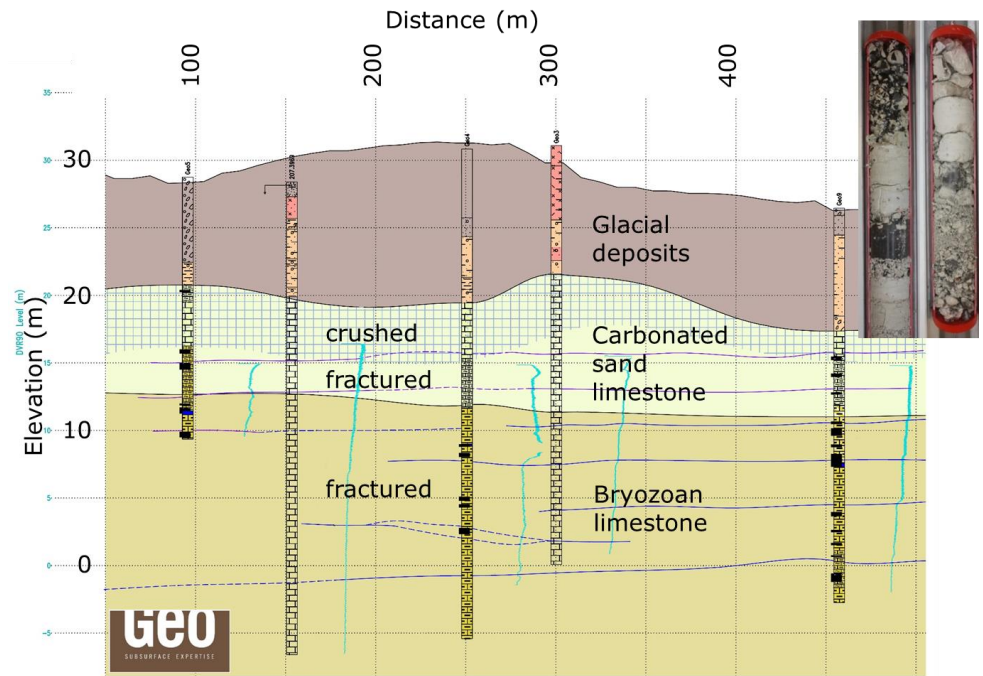
# Objectives

Modeling of contaminant plume migration in fractured limestone

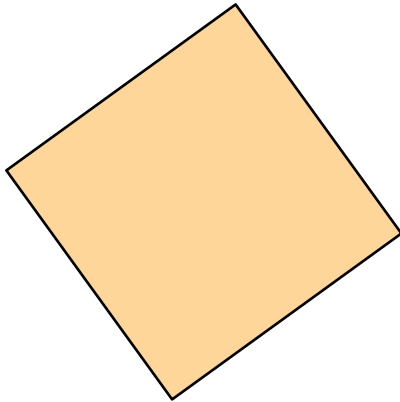
→ **Improved risk assessment, site monitoring and remediation design**



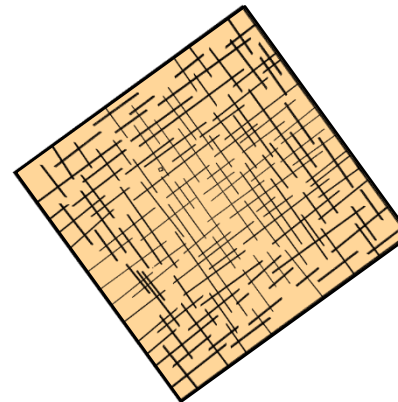
# Site Assessment Geology



Equivalent Porous Media  
(EPM)

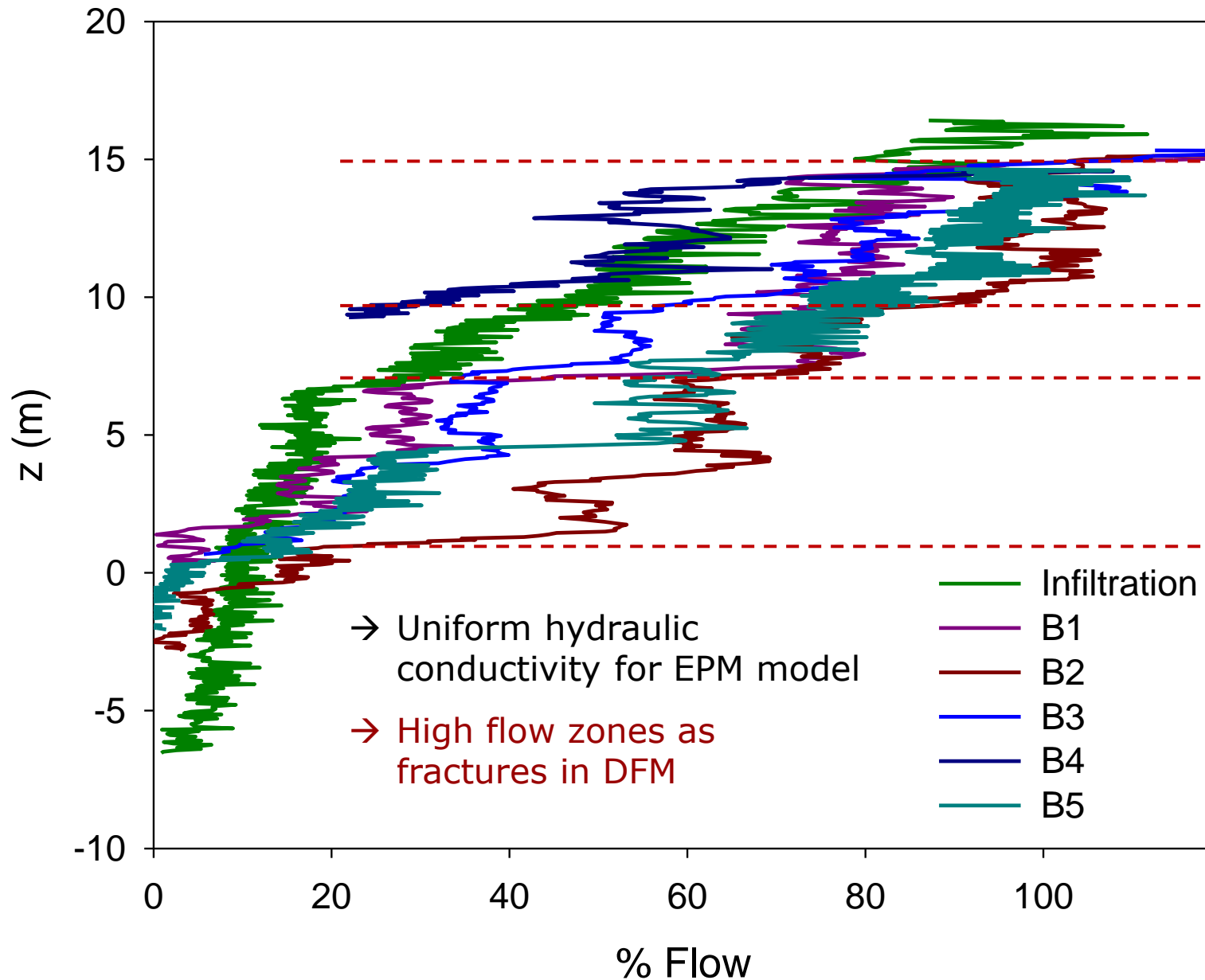


Discrete Fracture Model  
(DFM)



**Which model is right?**

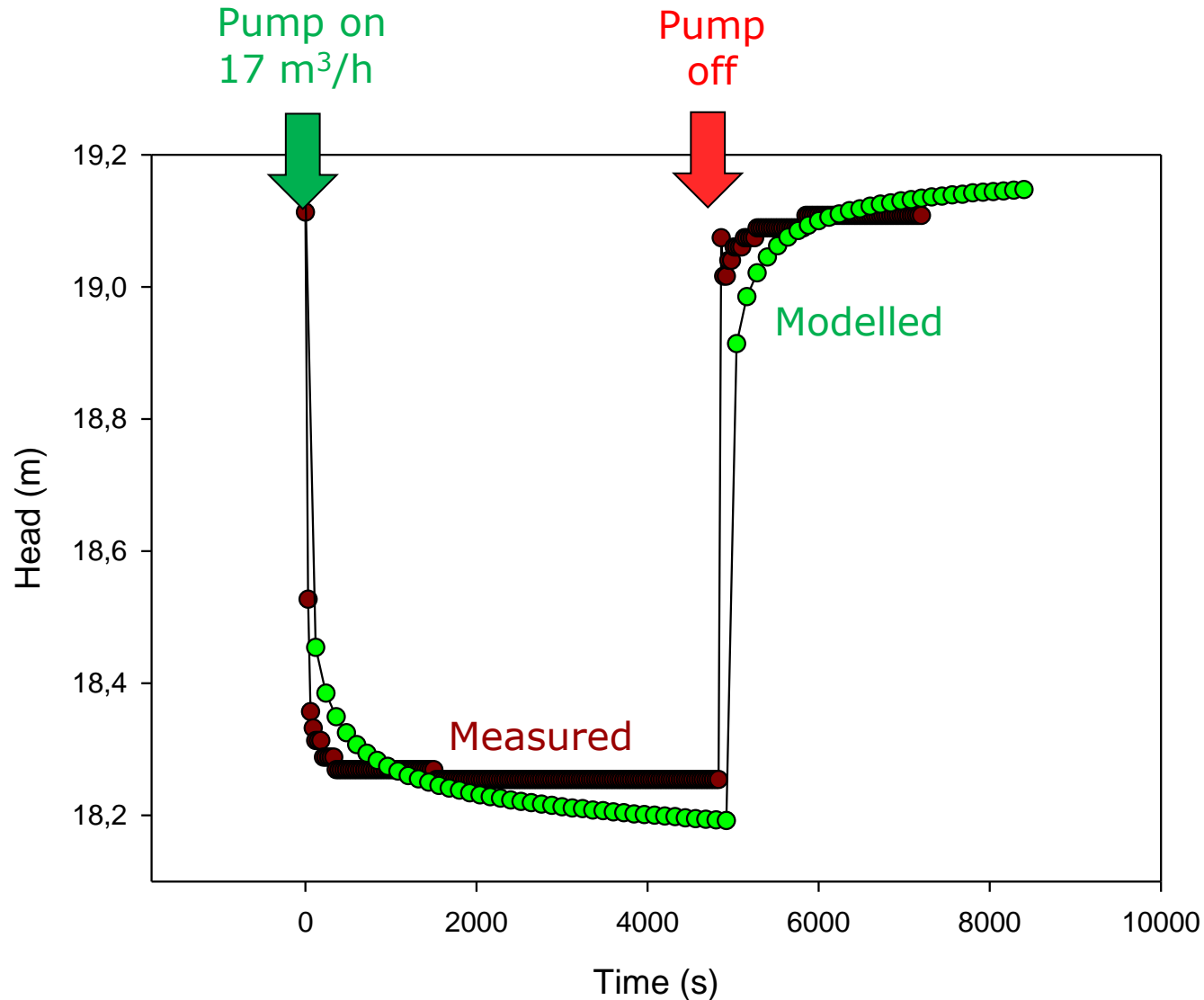
# Flow log data – high conductive zones







# Site Assessment - hydrogeology

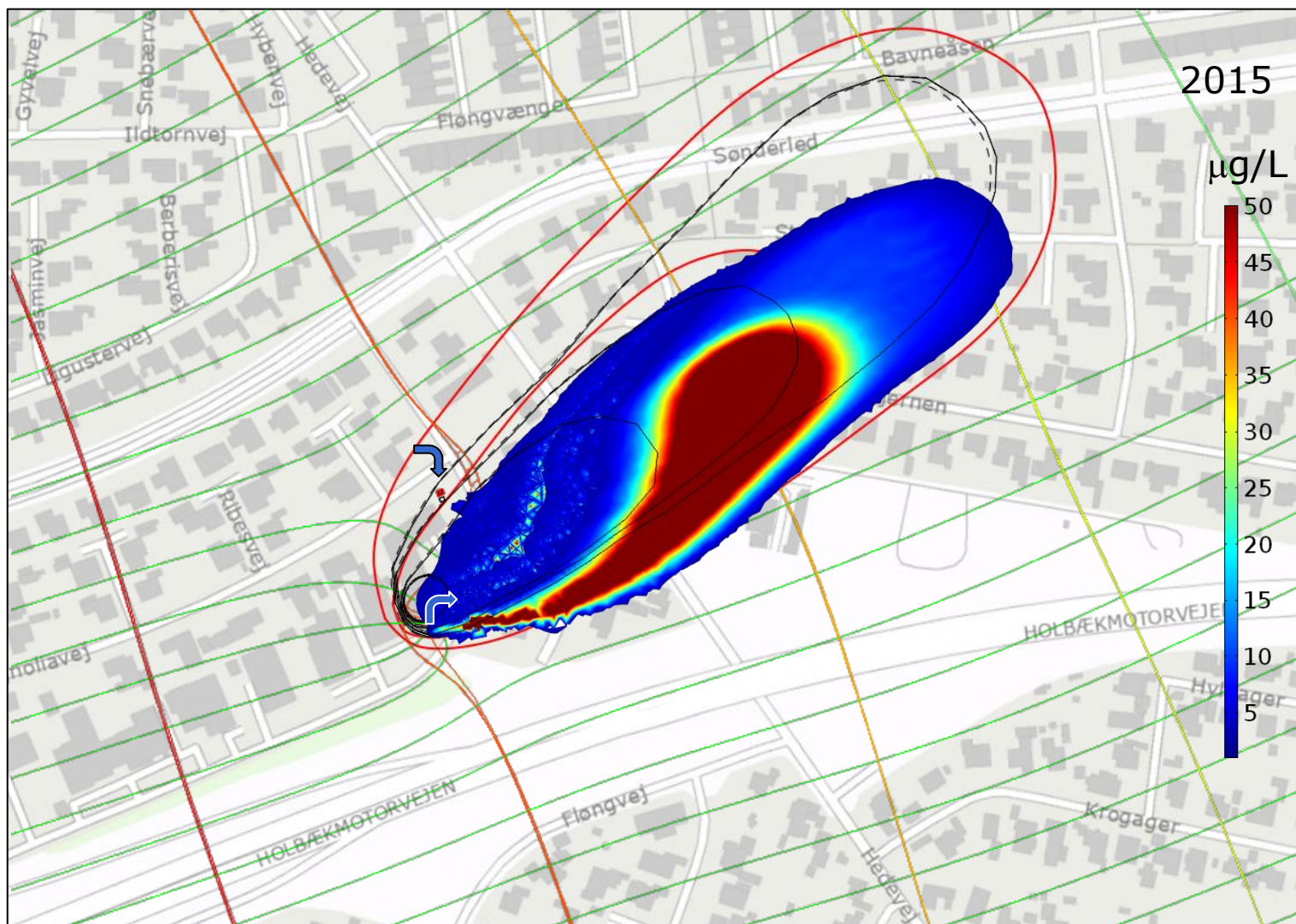
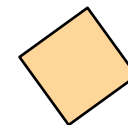


**Smart pump tests – (almost) zero cost!**

# Site Assessment – contaminant distribution

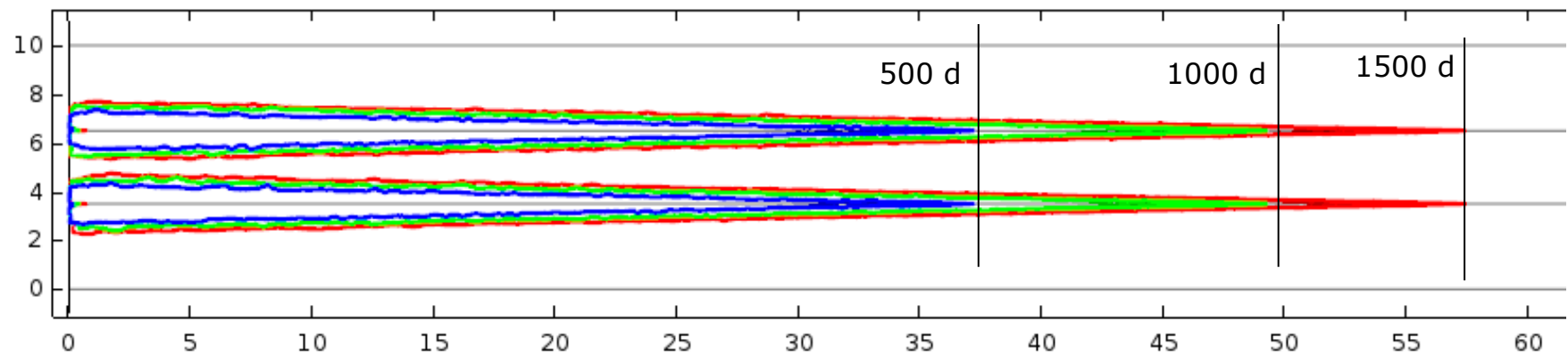
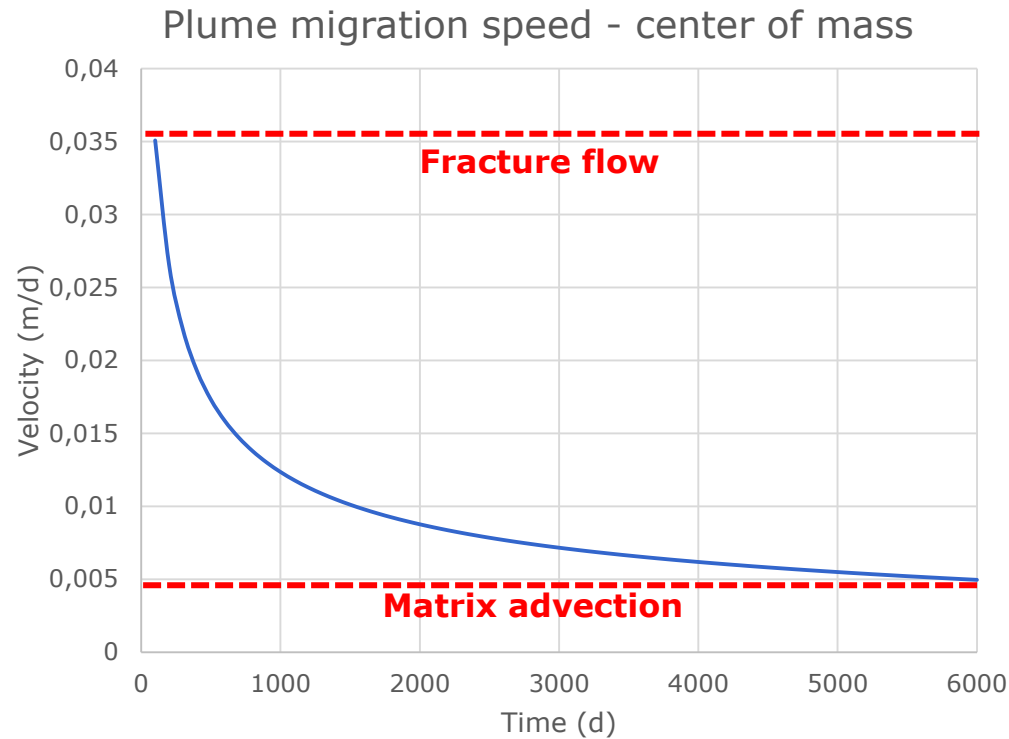
Modeled plume propagation 2007-2015

(equivalent porous medium model)

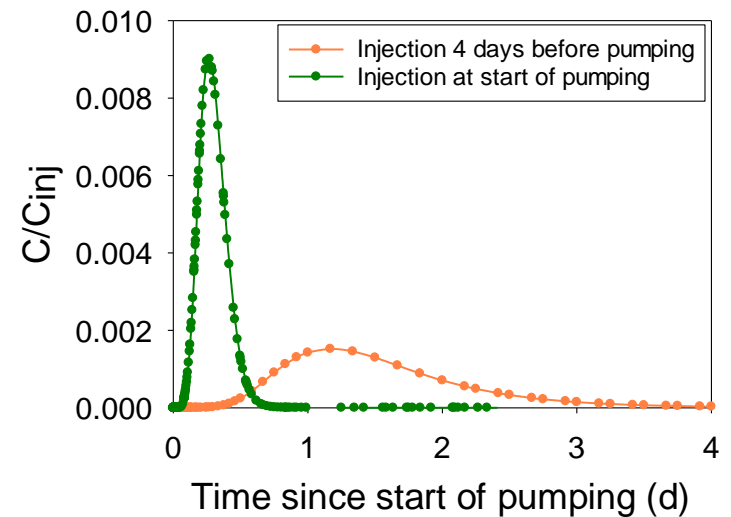
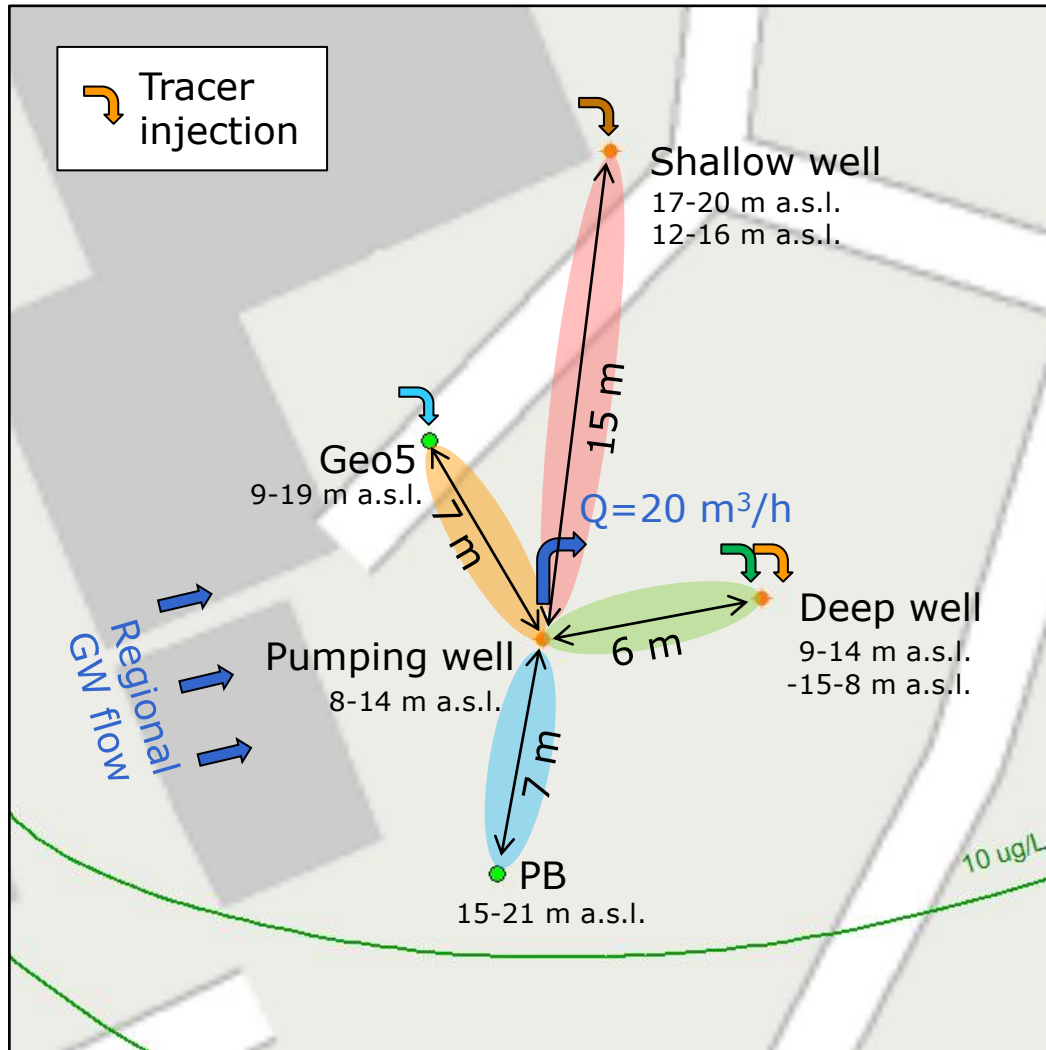




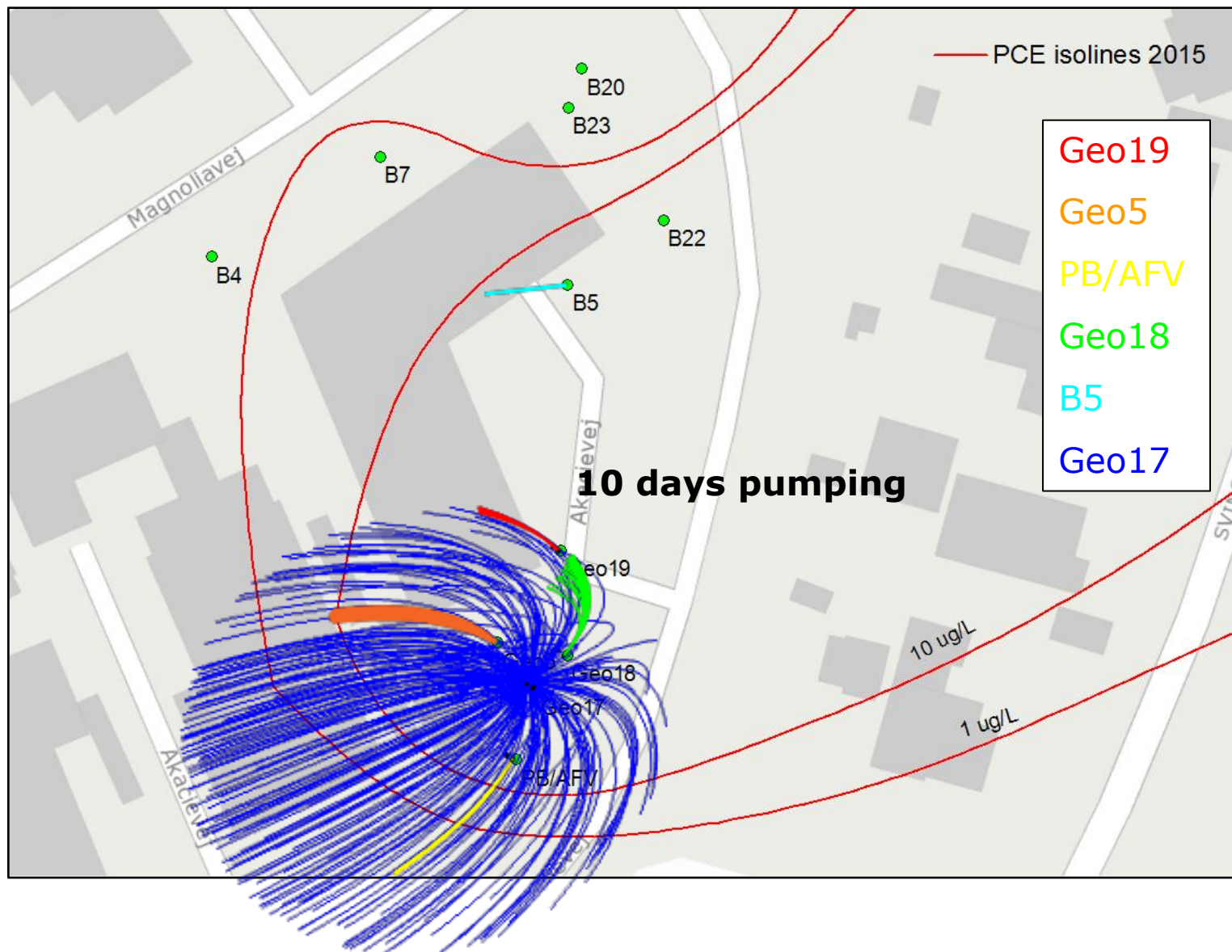
# Site assessment - Contaminant distribution



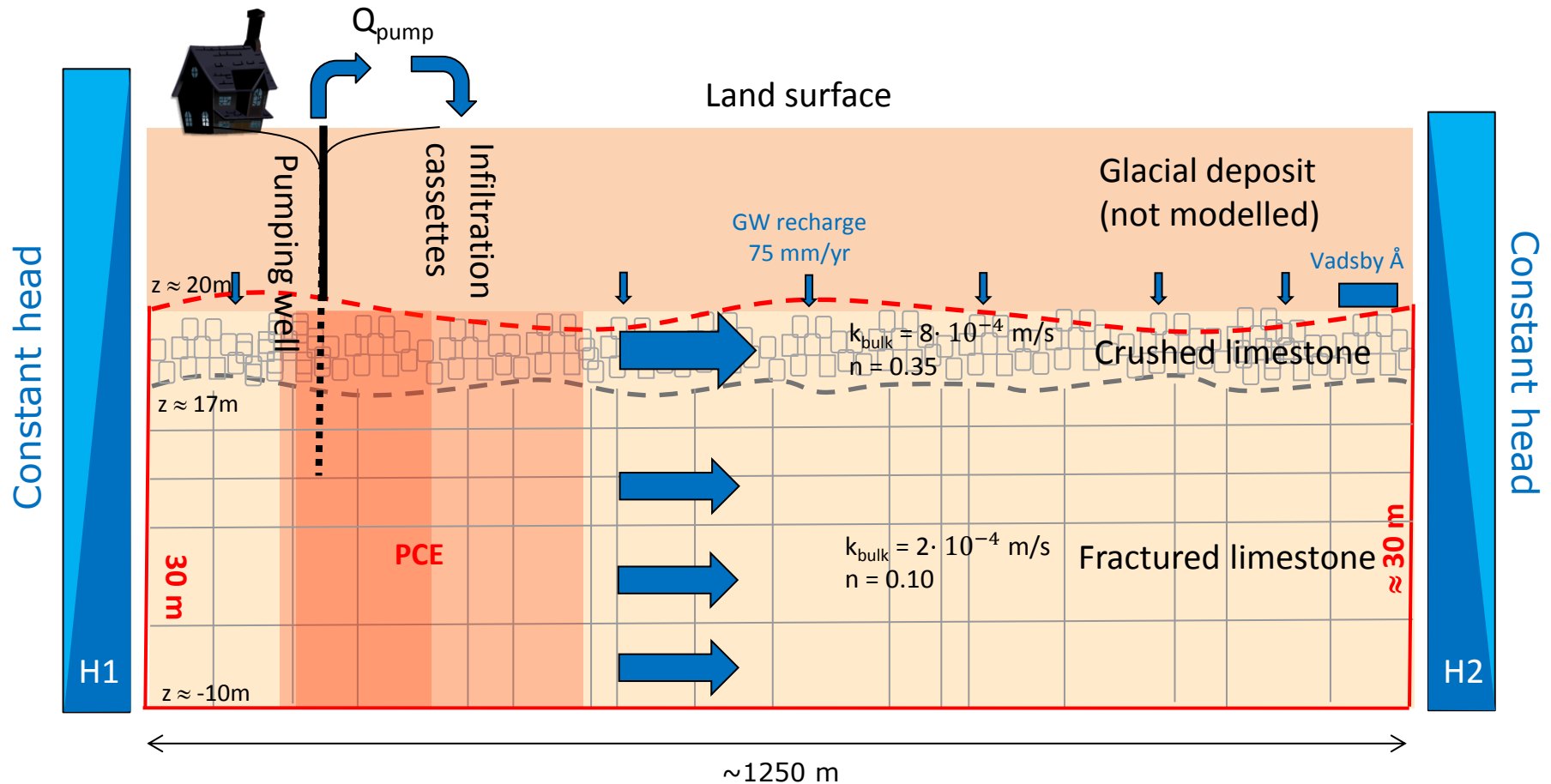
# Site Assessment: field work planning



# Site assessment – field work planning

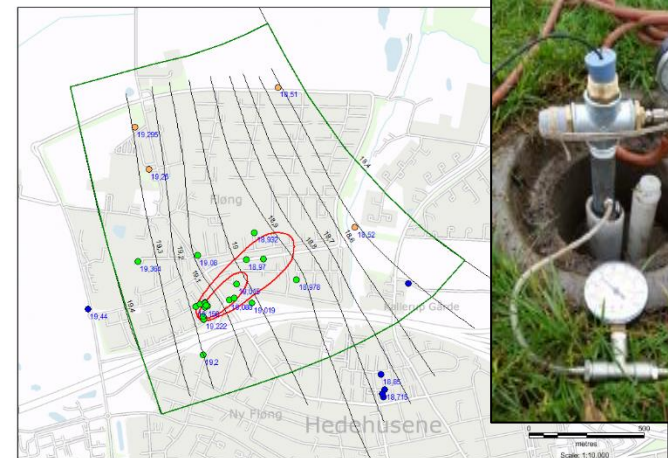
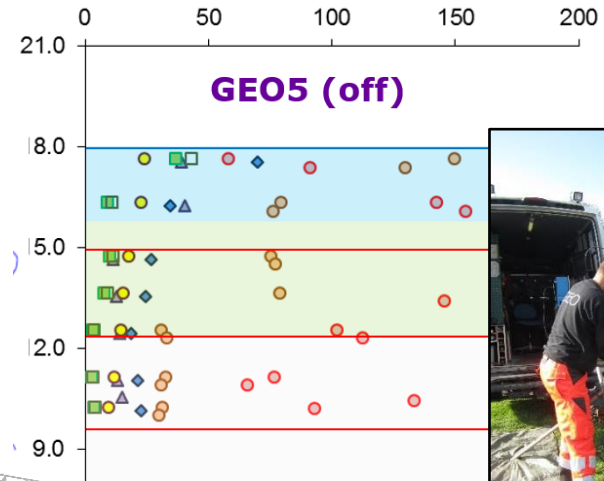
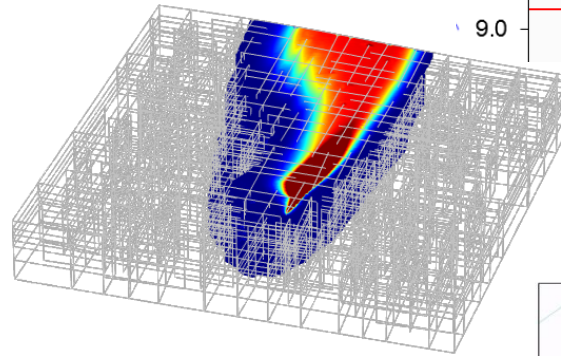
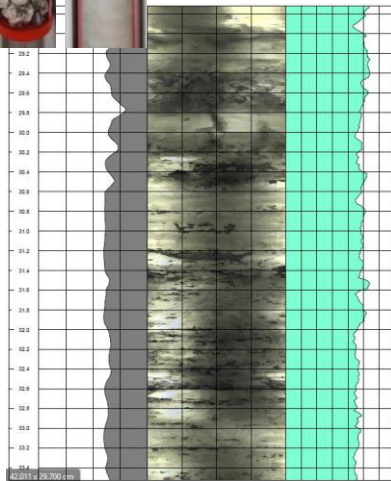
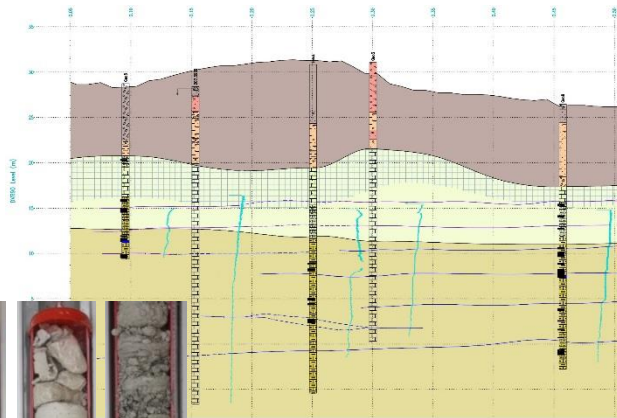


# Conceptual model development



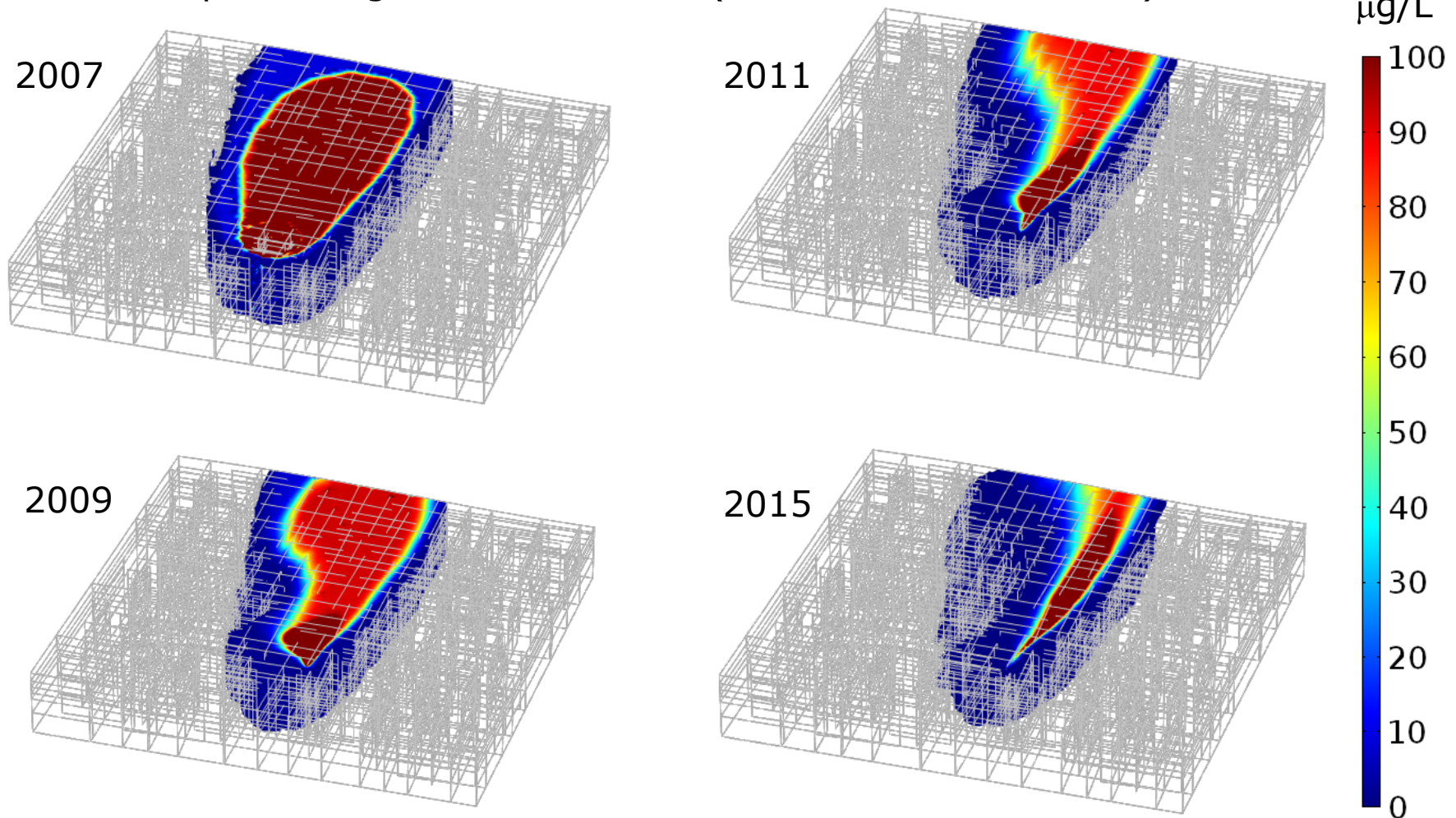


# Conceptual model development



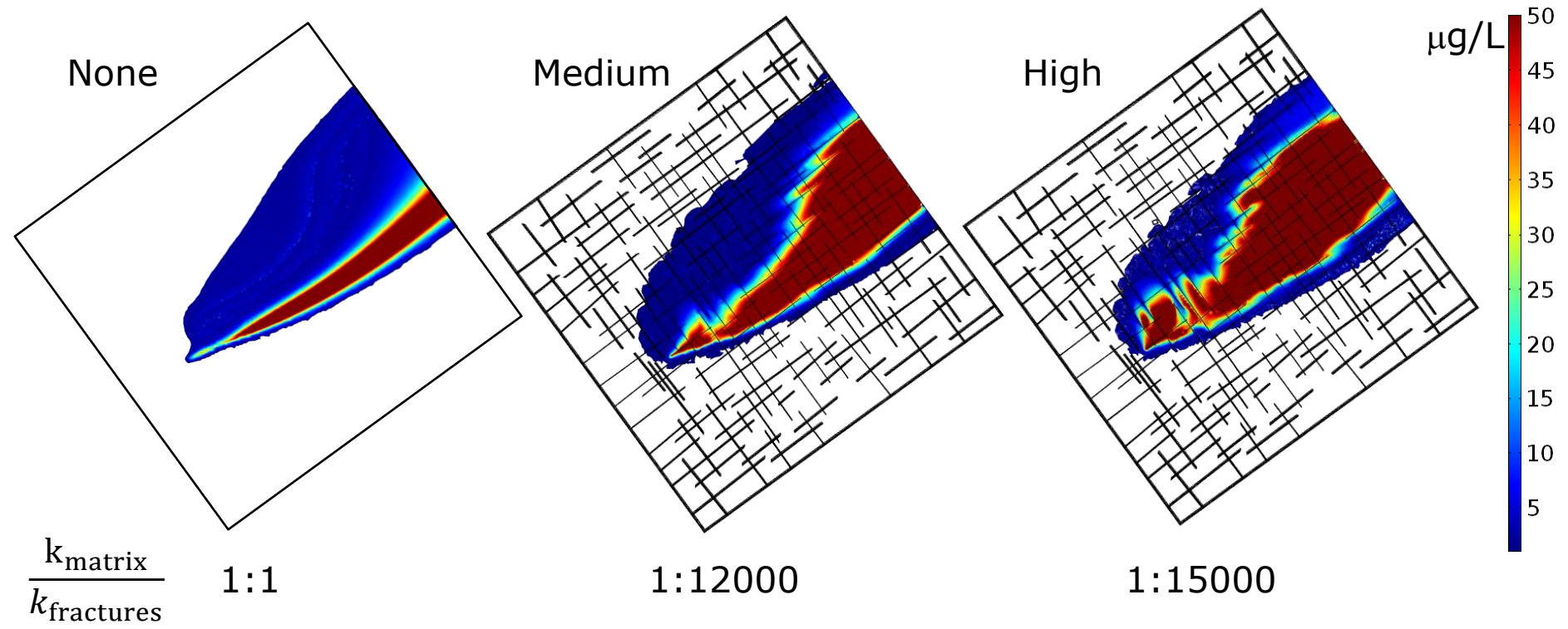
# Models

Simulated plume migration 2007-2015 (Discrete-fracture model)



$$\frac{k_{\text{matrix}}}{k_{\text{fractures}}} = 1/4000$$

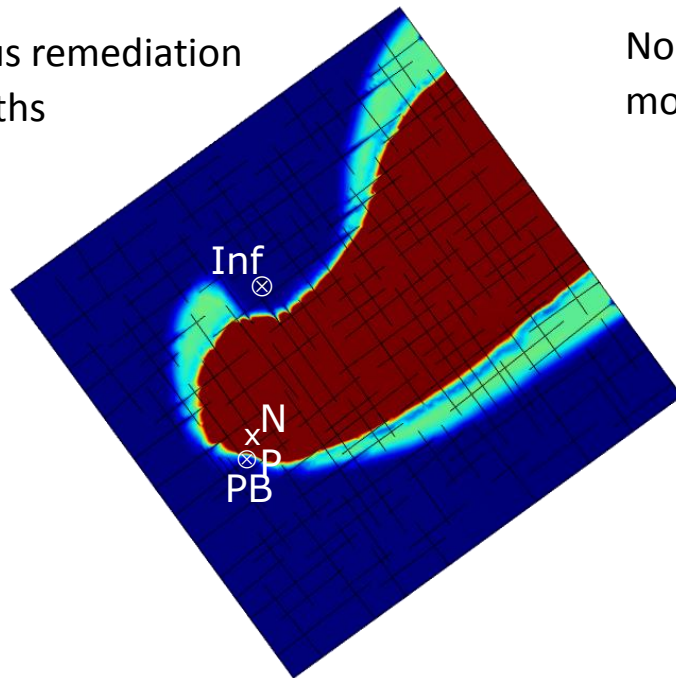
# Models



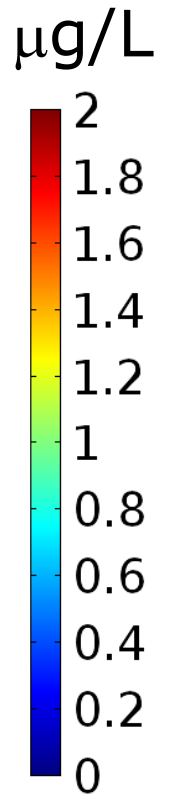
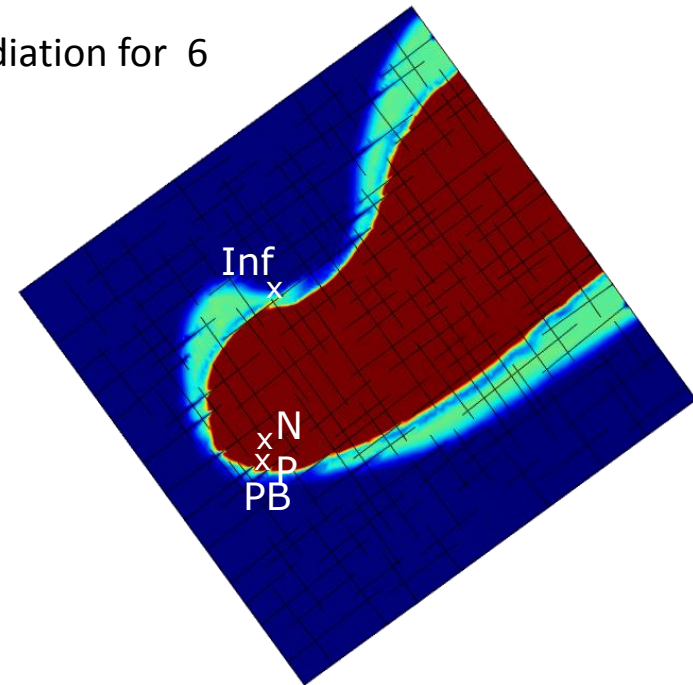


# Decisions

Continuous remediation  
for 6 months



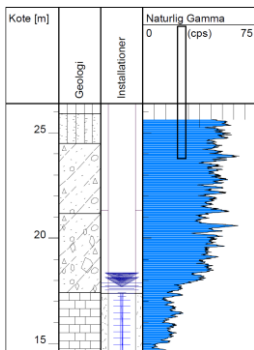
No remediation for 6  
months



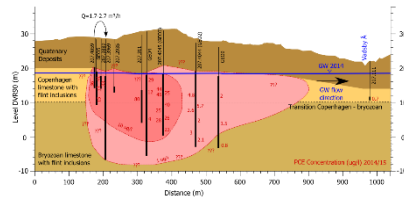


# Improved site investigation

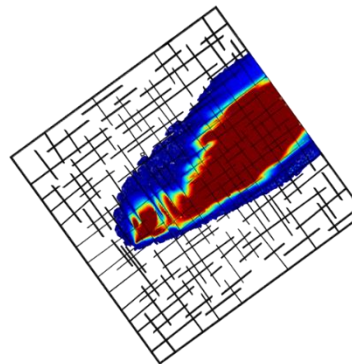
**Collect data**



**Conceptual model**

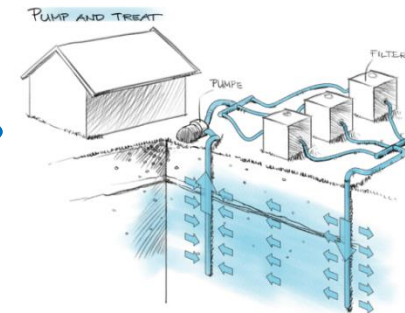


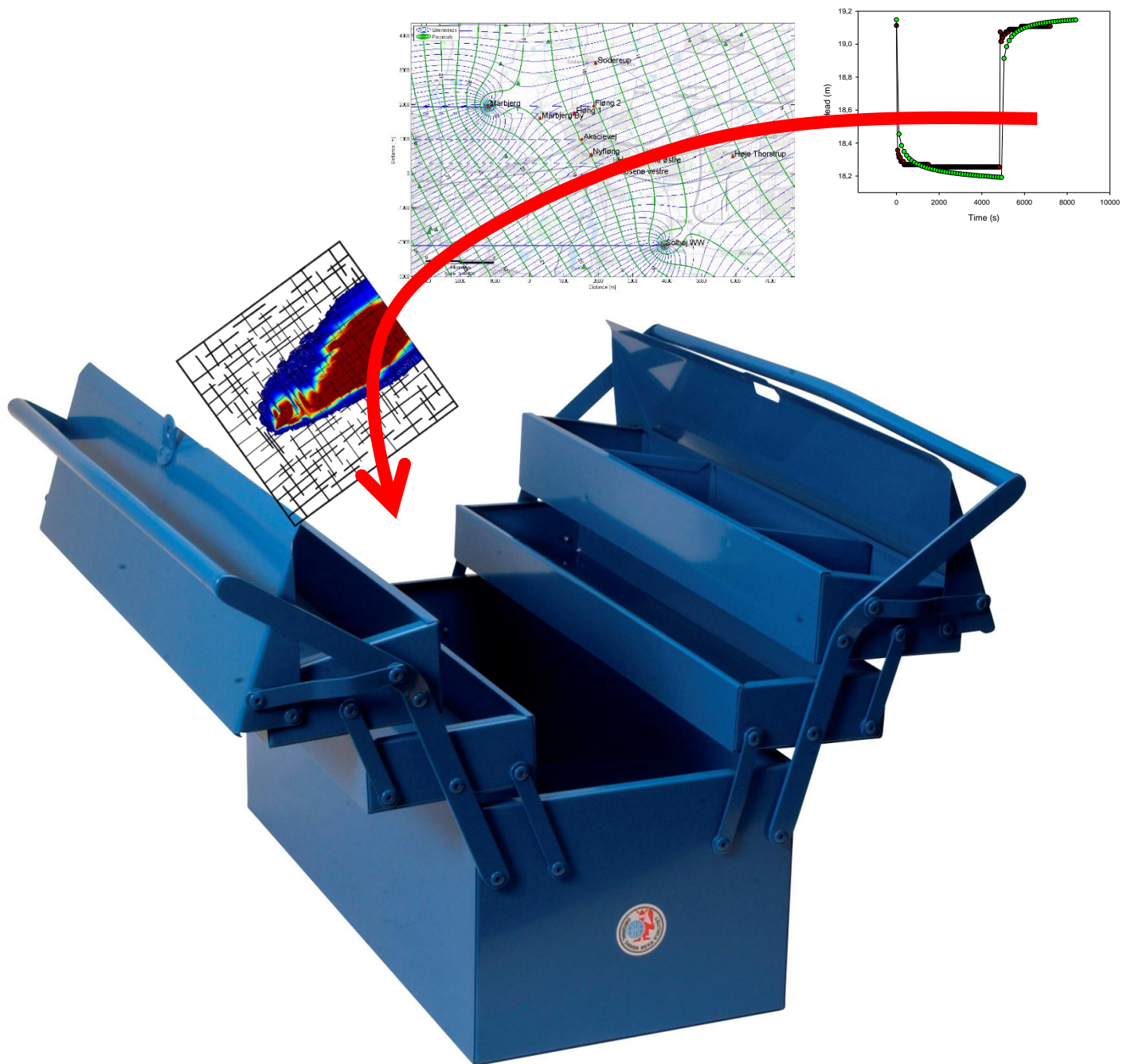
**Numerical model**



Geology  
Hydrogeology  
Contaminants

**Decisions**





# Acknowledgements



**The Capital Region  
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